

TECTAM, a Modified Technology Acceptance Model to Assess E-Commerce Technologies adoption by Thai SME

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Abstract- In 2002, the Thai government has endorsed an information technology policy framework entitled “Thailand Vision towards a Knowledge-Based Economy (IT 2010)”. The policy emphasises the roles of information technology for the enablement and facilitation of economic and social development. One of the objectives is to develop the ability of small and medium enterprises (SMEs) to compete in the world market. Although there are successful cases, majority of the companies among the Thai SMEs sector are still in an early stage of utilising E-commerce technologies to reap benefits from new opportunities. Therefore, there is a need to understand, to extract and to acquire knowledge about the adoption and use of the e-commerce technologies by SMEs in Thailand. Technology Acceptance Model (TAM) has been applied to many studies on the adoption and use of innovation and technologies. This proposed study intends to use a modified TAM named, TECTAM (Thai E-commerce Technology Acceptance Model), as a research tool and model to study e-commerce acceptance among the Thailand’s SMEs sector. The predominant dimensions of this study are based on TAM perceived usefulness (PU) and perceived ease of use (PEOU). In terms of PU, the near-term and long-term usefulness are considered. On the other hand, the PEOU will be concerned with the social influence processes and the cognitive instrumental processes. In addition, this study will investigate how to increase the benefits from the relationship between TAM and other approaches. Finally, the study aims to apply the use of TECTAM model in terms of e-commerce technologies acceptance and how they could be used. While the project is in a preliminary stage, the paper will detail the proposed methodology and approach of this project.

I. INTRODUCTION

In studies of the adoption of information systems/technology, Technology Acceptance Model (TAM) is one of the most dominant research models which have been used widely. TAM composes of two key determinants: perceived usefulness (PU) and perceived ease of use (PEOU). In this paper, they are hypothesised to be the essential basis for verifying user acceptance of e-commerce/e-business technology in Thailand. This paper reviews the TAM concepts and modifies the TAM to investigate and gain knowledge about how SMEs adopt e-commerce technologies in Thailand. The rapid growth of Information and Communication Technology (ICT) in Thailand has made user acceptance an increasingly critical issue in technology implementation and management. In this proposed research, PU and PEOU of Thai public organisations, SMEs, and online customers will be investigated to evaluate SMEs’ adoption and use e-commerce technologies.

II. E-COMMERCE TECHNOLOGY ADOPTION BY SMEs IN THAILAND

In 2000, the Thai government released the SMEs Act for promoting and developing Thai SMEs. In the meantime, the Office of Small and Medium Enterprises Promotion (OSMEP), the Institute for Small and Medium Enterprises Development (ISMED), and the Small and Medium Enterprise Development Bank of Thailand were founded. The objectives of these organizations are to contribute towards the development of the SMEs in order to elevate them up to the global commercial stage. They also act as incubator and nurturer of these business sectors. There are three key platforms or vehicles in the Thai government’s SMEs promotion policy:

- investment promotion,
- financial assistance, and
- technical and management consultancy [1], [2].

It is recognized that the predominant factors influence the achievement of the e-commerce adoption and use are: ICTs groundwork, government planning and policy, payment systems, taxation, law concerning e-commerce transactions, data protection, consumer protection, intellectual property rights, e-commerce security and safety, efficient transportation, and people recognition. [1], [3]. Furthermore, in the Thailand Vision towards a Knowledge-Based Economy (IT 2010) document, it points out that ICT is an enabler to increase business productivity and capacity for business competition [4]. However, the e-commerce adoption and use of Thai SMEs are currently in a state of early growth. Most of the entrepreneurs who use e-commerce strategy for competitive advantages are still mainly within the hospitality businesses, and a relatively small portion in the trade and retailing sectors. In summary, Thai SMEs lack of e-commerce innovation is mainly because of their limitations of resources in terms of budget and e-commerce knowledgeable personnel [2].

Thailand Investor Service Centre [5] points out that the important and long term policies of the Thai government should be: construction of ICTs network to support the production factor; developing worldwide marketing strategies; encouraging SMEs to do business by e-commerce, and, establishing channels of communication among industries in the capital and regional areas. Thailand now has two categories of Internet Service Providers (ISPs) comprises of eighteen commercial ISPs and four non-commercial Internet hubs. In addition, two Internet exchanges have been set up:

- a) The ThaiSarn Public Internet Exchange (PIE) is a peering point for Thai ISPs to access public information on the ThaiSarn Public Access Network (PubNet) operated by the Network Technology Laboratory (NTL) of the National Electronics and Computer Technology Center (NECTEC).
- b) CAT-NIX (Communication Authority of Thailand – National Internet Exchange) has two sectors: *IIG* is the Internet Gateway of Thailand connecting Thai ISPs to the global networks, and, *NIX* is the national exchange among all ISPs in Thailand providing exchange for the domestic traffics.

Furthermore, in 2006, the total number of Thai domain names registered under '.th' was 21,976 in which 15,436 of the domain names were '.co.th', or 70.24 % of the total registered names. This ratio indicated that the growth of online businesses comparing to the year 2000 has increased by more than 300%. The rate of increase for the Internet users in Thailand since 2000 has indicated a constant strong growth. This has provided ample opportunities for the Thai population to access information resources worldwide and to carry out online shopping or expand business operations through e-commerce [6].

III. TECHNOLOGY ACCEPTANCE MODEL (TAM)

TAM is adapted from the Theory of Reasoned Action (TRA) model which explains and predicts the behaviour of people in a specific situation [7]. TRA proposes that a person's behaviours are determined by the person's intention to perform the behaviours; and the 'intention' is a function of the person's attitudes toward the behaviours and subjective norms. Therefore, 'intention' is the best predictor because it cognitively represents a person's readiness to perform certain behaviours which are antecedent. Intention is determined by three factors: attitude towards the specific behaviour, subjective norms, and perceived behavioural control [8]. A main purpose of TAM is to present an approach to study the effects of external variables towards people's internal beliefs, attitudes, and intentions. TAM proposes the perceived ease of use (PEOU) and perceived usefulness (PU) as the most important factors for explicating technology acceptance. Davis, Bagozzi, and Warshaw [9] pointed out that external variables such as direct experience, objective usability, and self efficacy intervene indirectly to PEOU and PU (in TAM), attitude and subjective norms (in TRA). Furthermore, Davis [10] used methods of Fishbein and Ajzen [7] for assessing the users' Attitude Towards using (AT) and Behavioural Intention to use (BI). However, subject norms were excluded because of its slight effect on BI. On the other hand, Venkatesh and Davis [11] reconsidered the influence of subjective norms to people behaviours and found that the subject norms have effects towards the behaviour. Venkatesh and Morris [26] used the proposed model to analyse how some factors such as gender and experience also influence the intention to use information systems.

In summary, TAM has developed and evolved continually over the years. It has been verified and confirmed by many scholars as a practical theoretical model for the investigation of users' behaviours. In this proposed research, it is

therefore utilised to study the acceptance of e-commerce technologies (ECT) by SMEs and users based on notion of information systems within the Thai context.

IV. RELATIONSHIP BETWEEN TAM AND OTHER MODELS

Although TAM has been verified by scholars worldwide, combining TAM with other theoretical models is more useful for investigating the technological acceptance by users. For example, Attitude Toward behaviour (AT) and subject norm from the Theory of Reasoned Action (TRA) are used by Davis [10] in conjunction with TAM to clarify how the subject norm affects technology adoption and acceptance. Taylor and Todd [12] combined three core constructs from the Theory of Planned Behaviour (TPB) with TAM to develop a hybrid model for investigating technological acceptance. The three core constructs are: attitude toward behaviour, subject norm, and perceived behavioral control. Rogers [13] proposed a five stage model for the innovation decision process. The five stages are: knowledge, persuasion, decision, implementation, and confirmation. Subsequently, the model was applied to study individual decision making process of whether to adopt or reject innovation in the TAM context [14], [15].

TAM is also linked to the Task-Technology Fit Model (TTF). The core concept of TTF is how to measure the ability of information technology to support organisation tasks [16]. Four main constructs of TTF model are: task characteristics, technology characteristics, task-technology fit, and utilisation or performance. These constructs are inter-related to each other. The TTF and TAM have recently been combined to predict e-commerce adoption by consumers [17]. Dishaw and Strong in [18] extended TAM with TTF to workplace technology adoption. Benford and Hunton [19] integrated TAM and TTF to investigate system adoption for accounting decision making. Ziguers, Buckland, Connolly and Wilson use TAM-TTF to predict group decision support system acceptance. Vankatesh, Morris, Davis and Davis developed the Unified Theory of Acceptance and Use of Technology (UTAUT) which formulates, integrates and broadens further than the TAM [21]. UTAUT is a new theory which combines eight theories together: TRA, TAM, MM (Motivational Model), TPB, TAM-TPB, MPCU (Model of PC Utilization), IDT (Innovation Diffusion Theory), and SCT (Social Cognitive Theory). The UTAUT consists of four key determinants of intention and usage: performance expectancy, effort expectancy, social influence, and facilitating conditions. Furthermore, the variables of gender, age, experience and voluntariness of use moderate the relationship in the model [21]. Anderson and Schwager use the UTAUT for investigating wireless LAN technology adoption by small and medium enterprises (SMEs) [22].

In a similar fashion, the proposed model in this study is based on TAM and extended with variables which have been proposed in models such as TRA, TBP, UTAUT and TTF. It is expected that the extended model will be able to provide a comprehensive framework to identify the influencing factors for e-commerce technology adoption and use by SME's in Thailand. The model is described in the next section.

V. TECTAM – THAI E-COMMERCE TECHNOLOGY ACCEPTANCE MODEL

This paper aims to propose a model based on TAM to investigate e-commerce technology acceptance and adoption by Thai SMEs and related stakeholders. A number of previous predominant TAM research reports have been reviewed in order to establish the appropriate variables, research tools, methodologies and how to apply them to the context of this study. The TECTAM model is developed and proposed as shown in Figure 1. The model is largely based on TAM theory and it is believed that it is appropriate for the investigation of e-commerce technologies acceptance and adoption by SMEs.

Three types of questionnaires are developed for gathering data from SMEs, online customers, and related government organisations or institutions. Background factors of respondents are based on Ajzen's notion [8]. They are: personal factors (general attitude, personality traits, value, emotion, and intelligence), social factors (age, gender, education, and income), and information (experience, knowledge, and media exposure). Moreover, three types of knowledge [23] are used by Bunge as one of the external variables. In the context of this study, the knowledge is referred to:

- Behavioral Knowledge is the knowledge of Thai public sector, SMEs and online-customers concerning with how to do, what to do, and what action to undertake about ECT.
- Factual Knowledge is the knowledge of Thai public sector, SMEs and online-customers about information and events related to ECT.

- Conceptual Knowledge is the knowledge of Thai public sector, SMEs and online-customers on high level abstract concepts, ideals and judgments about ECT.

The validation and evaluation of TECTAM will be based on survey and interviews. Construction of questionnaires and interview questions are derived from Ajzen and Fishbein [24]; Davis, Bagozzi, and Warshaw [9]; Legris, Ingham, and Collette [25]; and, Venkatesh, Morris, Davis, and Davis [21]. Data will be collected and analysed to prove the following hypotheses:

- PU of the public sector, SMEs, and online customer are positively related to attitude towards ECT
- PU of the public sector, SMEs, and online customer are positively related to intention to use ECT
- PEOU of the public sector, SMEs, and online customer are positively related to attitude towards ECT
- PEOU of the public sector, SMEs, and online customer are positively related to intention to use ECT
- Attitude towards ECT of the public sector, SMEs, and online customer are positively related to intention to use ECT
- Intention to use ECT the public sector, SMEs, and online customer are positively related to actual ECT use
- External variables of the public sector, SMEs, and online customer are positively related to PU
- External variables of the public sector, SMEs, and online customer are positively related to PEOU

Finally, methodologies for the study are a) field study by questionnaire survey; b) the reliability coefficient (Cronbach's alpha) will be used for measuring the eight hypotheses.

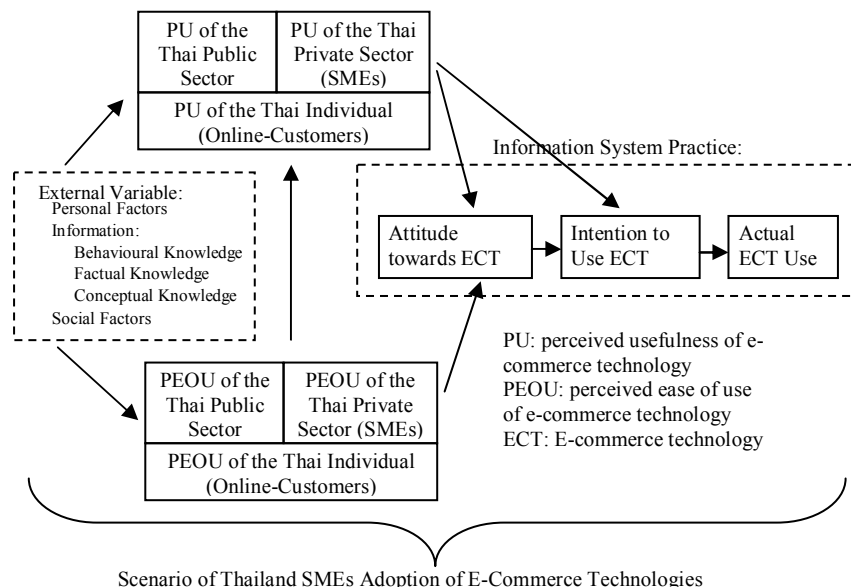


Figure 1: TECTAM for Assessing the Acceptance and Adoption of ECT by Thai SMEs

VI. CONCLUSION AND DISCUSSION

The proposed model based on TAM theory in Figure 1 integrates three sectors involved with SMEs in Thailand. Much of the previous research reports on ECT adoption have focused on individual and separate sectors. It is difficult to assess the effects of ECT adoption from a country's perspective. In this proposal, it is intended to emphasise an integrated model comprising all these sectors and to explore the situation of ECT adoption by Thai SMEs in a holistic approach. It is expected that the outcomes from this study will not only produce a report card on the current situation, but to provide appropriate suggestions to the relevant stakeholders on the policies and steps to be taken. It is anticipated that such measures will promote the adoption of ECT and contribute to Thailand's economy.

Under the Thai Government's direction and support, the infrastructures have improved and the number of internet users is increasing steadily. While the SME sector is one of the major contributors to the country's economy, ECT is still not widely used due to various reasons. This proposed study will apply the proposed model, TECTAM, to assess ECT adoption and acceptance in Thai SME sector. This study intends to verify the hypotheses on the influencing factors of PU and PEOU on behavioral intention to use and attitude towards ECT. Based on the study's finding, implications for ECT acceptance will reflect an overview of the current situation of Thailand SMEs adoption of e-Commerce technologies. The results of such research should provide suggestions and advice for successful ECT practice to people who are involved in the development and utilization of ECT. It is also expected that the finding will provide insight to other industrial and business sectors in Thailand.

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